

CLAIMS

1. A dual mode device for generating a cross product or a dot product from a first vector and a second vector, the first vector having a first set of components and the second vector having a second set of components, the device comprising:

a dual mode controller receiving the first and second vectors, the dual mode controller being configured to select vector components for evaluating a cross product component or a dot product in response to a first signal, the first signal indicating whether to generate a cross product component or a dot product; and

a dual mode unit coupled to receive the selected vector components for generating the cross product component or the dot product in response to the first signal.

2. The dual mode device as recited in claim 1, wherein the dual mode unit outputs the cross product component when the select signal indicates generation of the cross product component and wherein the dual mode unit outputs the dot product when the select signal indicates generation of the dot product.

3. The dual mode device as recited in claim 1, wherein the dual mode controller receives a second signal for indicating the cross product component to be generated and selects the vector components for evaluating the cross product component or the dot product in response to the second signal.

4. The dual mode device as recited in claim 1, wherein the dual mode controller selects the vector components that are different from the cross product component to be generated when the first signal indicates generation of the cross product component.

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5. The dual mode device as recited in claim 1, wherein the dual mode controller changes the sign of one or more selected vector components for transmission to the dual mode unit when the first signal indicates generation of the cross product component.

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6. The dual mode device as recited in claim 1, wherein the first set of components includes  $A_x$ ,  $A_y$ , and  $A_z$  and the second set of components includes  $B_x$ ,  $B_y$ , and  $B_z$ , and wherein the dual mode controller selects all components of the first and second sets when the first signal indicates generation of the dot product.

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7. The dual mode device as recited in claim 1, wherein the dual mode unit includes a plurality of multipliers and adders that are arranged to generate the cross product component or the dot product.

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8. The dual mode device as recited in claim 7, wherein the dual mode unit uses at least one multiplier and at least one adder to generate the cross product component or the dot product.

9. The dual mode device as recited in claim 1, wherein the dual mode controller is configured to select the vector components for evaluating the cross product when the first signal indicates generation of the cross product, wherein the dual mode unit includes a plurality of sub-dual mode units for generating a plurality  
5 of cross product vector components, each sub-dual mode unit generating one cross product vector component such that the dual mode unit generates a cross product of the first and second vectors.

10. The dual mode device as recited in claim 1, wherein the dual mode unit  
10 is used in a lighting subsystem that is configured to generate diffuse light, specular light, or spotlight values.

11. A dual mode device for generating a cross product or a dot product  
from a first vector and a second vector, the first and second vectors having a plurality  
15 of components, the device comprising:

a dual mode controller receiving the first and second vectors, the dual mode controller being configured to select vector components for evaluating a cross product or a dot product in response to a first signal, the first signal indicating whether to generate a cross product or a dot product; and

20 a plurality of dual mode units coupled to receive the selected vector components for generating the cross product or the dot product in response to the first signal, each dual mode unit generating one cross product vector component of the cross product, the dual mode units generating and outputting the cross product vector

and  
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components as the cross product when the select signal indicates generation of the cross product component.

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5 12. The dual mode device as recited in claim 10, wherein the dual mode controller changes the sign of one or more selected vector components for transmission to the dual mode units when the first signal indicates generation of the cross product.

10 13. The dual mode device as recited in claim 10, wherein the first vector includes components Ax, Ay, and Az and the second includes components Bx, By, and Bz such that the dual mode units generate the cross product by producing cross product components Cx, Cy, and Cz.

15 14. The dual mode device as recited in claim 12, wherein one of the dual mode units is selected to generate the dot product of the first and second vectors when the first signal indicates generation of the dot product.

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20 15. The dual mode device as recited in claim 10, wherein the dual mode units are used in a lighting subsystem that is configured to generate a diffuse light value, a specular light value, and a spotlight value.

16. The dual mode device as recited in claim 10, wherein each of the dual mode units includes a plurality of multipliers and adders that are arranged to generate the associated cross product component or the dot product.

17. The dual mode device as recited in claim 7, wherein the dual mode unit uses at least one multiplier and at least one adder to generate the cross product component or the dot product.

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18. In a computer system, a method for generating a cross product or a dot product from a first vector and a second vector, the first vector having a first set of components and the second vector having a second set of components, the method comprising:

10 receiving the first and second vectors for generating a cross product component or a dot product,

receiving a first signal indicating whether to generate a cross product component or a dot product;

15 selecting vector components for evaluating the cross product component or the dot product in response to the first signal, and

in response to the first signal and the selected vector components, generating the cross product component when the first signal indicates generation of the cross product component and generating the dot product when the first signal indicates generation of the dot product

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19. The method as recited in claim 18, wherein the sign of one or more selected vector components are changed for evaluating the cross product component when the first signal indicates generation of the cross product component.

20. The method as recited in claim 18, wherein a plurality of cross product vector components comprising a cross product vector are generated in parallel.

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